Random Sample Methodology

Methodology

Random sampling consists of selecting a representative subset of the fleet and acquiring full IM147 emissions data from the vehicle for purposes of program evaluation. The methodology is detailed below.

The subject fleet for random sampling is 1967 and newer gasoline-powered cars and light-duty trucks (ETW < 6000). There are three categories:

- 1967-1980 vehicles which are subjected to a loaded / idle test for pass and fail purposes
- 1981-1995 which normally receive an IM147 test
- 1996 and newer vehicles which are normally subjected to an OBD test for pass and fail purposes

The approach for selection of vehicles for the random sample is basically the same for all categories. Set percentages of vehicles are selected based on test sequence and pass/fail status. Any vehicle which is selected and fails is "flagged" so that it will be given full IM147 cycles on each test in this inspection cycle. The current percentages are shown in the table below.

		PASS	FAIL			PASS	FAIL			PASS	FAIL
67-80	% Initial	0.56%	1.00%	81-95	% Initial	0.17	1.00%	96+	% Initial	0.20%	1.80%
67-80	%Retest	0.90%	0.90%	81-95	%Retest	0.83	0.83%	96+	%Retest	1.60%	1.60%
67-80	%Sub	2.10%	2.10%	81-95	%Sub	1.90	1.90%	96+	%Sub	3.80%	3.80%

These percentages are the percentage of vehicles newly selected in the respective category and cycle. The actual number of vehicles subjected to random sampling is this percentage plus retests of vehicles flagged in a previous cycle.

The flagging scheme will include coding to identify that this vehicle was a random sample vehicle, and indicated why they were included (chosen this cycle, chosen on previous cycle).

For 1967-1980 vehicles, a random IM147 will consist of 2 full IM147 cycles done after the official loaded / idle test but before the vehicle proceeds to position 2 in the testing lane. The random IM147 may be terminated as a result of difficulties with the vehicle without affecting the official test result. The record will be flagged accordingly. Additionally, the record will indicate whether the random IM147 met the excursion criteria. Since this is a "long test within a test", the entire test will be counted as more than one test for throughput calculations.

For 1981-1995 vehicles, a random IM147 will consist of 3 full IM147 cycles as part of the normal test. If the vehicle passes any cycle, then it passes. The official result will be the emissions from the first passing cycle. If the vehicle fails, the official result will be the emissions from the last cycle. Additionally, the record will indicate whether the random IM147 met the excursion criteria.

For 1996 and newer vehicles, a random IM147 will consist of 3 full IM147 cycles done after the official OBD test but before the vehicle proceeds to position 2 in the testing lane. Only OBD tests with a normal conclusion (able to connect and communicate, readiness set ready) will be subject to selection (this is a minor issue but there is no use using lane time gathering correlation data for anomalies). The random IM147 may be terminated as a result of difficulties with the vehicle without affecting the official test result. The record will be flagged accordingly. Additionally, the record will indicate whether the random IM147 met the excursion criteria. Since this is a "long test within a test", the entire test will be counted as more than one test for throughput calculations.

Miscellaneous Details Applicable to All Categories:
If a vehicle is randomly selected but is not capable of completing a series of IM147 cycles, e.g., traction control on new vehicles, insufficient power or condition for old vehicles, it will be flagged as such so it will not be selected again. ADEQ shall review the number of in-completed random sample tests to determine if adjustments to the random sampling rates are appropriate.
Random sampling will be conducted at all Area A stations and lanes.